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A PRELIMINARY ENQUIRY INTO INFLUENCES AFFECTING
GOVERNMENTAL EXPENDITURE PATTERNS BY FUNCTION
IN DEVELOPING COUNTRIES

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Economics

#682

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regulate FADS were ended?

Answer. The securities laws have been called the full employment acts for accountants and lawyers. I don't know how they would be affected in such a resource reallocation. One possibility is that more private jobs would be created by the diversity of the need for specialists in accounting language translation. From an optimistic point of view, de-regulation of FADS would benefit

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Summary

The purpose of this paper is to attempt to ascertain the primary influences affecting the relative distribution of governmental expenditures by major function in developing countries. The results are by no means as satisfactory as would be desired and additional work is clearly necessary. A few major conclusions can be offered, however. It is clear that the level of GNP per capita is only one influence on the pattern of expenditures. Increases in per capital income results in increases in expenditures on education and other social services. Low levels of literacy produce relatively high expenditures on education, which decline as literacy increases. Defense spending is related primarily to political and cultural conditions rather than per capita income. The influence of variables such as dictatorship, hostility of neighbors, and percentage of the population that is Moslem, on various expenditures indicates the range of noneconomic considerations that influence expenditure patterns.

A Preliminary Enquiry into Influences Affecting Governmental
Expenditure Patterns by Function in Developing Countries*

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INTRODUCTION

The search for successful strategies of economic development has led to the examination of the role of the public sector. Many studies have focussed on the size of the public sector in relation to national income (GNP or GDP) and some on the size of spending for a particular function. A pioneering study was that of Martin and Lewis in 1956¹, relating the size of the public sector and basic components of it, including administration, economic, educational and health expenditure to GNP. The Martin and Lewis goal of finding a normative rule to relate the expenditure/GNP ratio and the level of development was not fully attained, but they provide what they call a "frame of reference" for planners, estimating that for a country actively engaged in a development program, public expenditure will amount to between 19% and 22% of GNP. Williamson² used regression analysis on a larger and somewhat different sample of cross sectional data. His double logarithmic function relates GNP per capita to current expenditure on public services, total current revenue, and total revenue less defense expenditure, all expressed as proportions of GNP. He finds

*The authors are indebted to the University of Illinois Research Board for funds for this project, and to Professor Thomas Yancey and other persons for assistance.

¹Martin, Alison M. and W. A. Lewis, "Patterns of Public Revenue and Expenditure," Manchester School of Economic and Social Studies, Vol. 24 (September, 1956), pp. 203-44

²Williamson, J. G., "Public Expenditure and Revenue: An International Comparison," Manchester School of Economic and Social Studies, Vol. 29 (June 1961), pp. 43-56.

a strong, positive correlation in the first two cases. Richard Thorn¹ sought to expand on this idea by including "social forces". In examining the proportion of the total expenditure devoted to social expenditures he used GNP per capita as a measure of socio-economic conditions and dummy variables for former British dependencies and highly centralized governments. With the inclusion of the dummy variables his model explained more than 50% of the variance of the dependent variable. On the basis of an extensive study of 46 developing countries, Lall² concluded that per capita income was either not an adequate indicator of development, or development had no particular effect on the pattern of expenditure.

This paper attempts to explain the pattern of government spending for various purposes (expressing categories of expenditure as percentages of total expenditure) in terms of a variety of social, political, geographic, and demographic variables and to examine the significance of development for these patterns.

PUBLIC EXPENDITURE AND ECONOMIC DEVELOPMENT

If the nature and role of government change during growth, then patterns of national expenditure should be different for countries at different levels of growth. While other writers have examined the relationship between public expenditure and GNP and some work has been done on relative shares of certain types of expenditure, this paper attempts to determine what forces play a role

¹Thorn, R. S., "The Evolution of Public Finances During Economic Development," Manchester School of Economic and Social Studies, Vol. 35 (January 1967), pp. 19-55.

²Lall, S. and J. Schmedtje, "A Cross Section Analysis of Government Expenditure Patterns in Developing Countries," IBRD Economics Department Working Paper No. 21, June, 1968.

in the distribution of public monies among budgetary categories. Dividing the budget into "basic" (consisting of all current expenditure except agricultural subsidies, social insurance, defense spending, and public debt) and "total" which includes both current and capital public expenditure in all categories, the divisions used by Martin and Lewis, is one approach, but further disaggregation might be expected to provide a better explanation of how the pattern of government expenditure relates to the level of economic development. For this study, expenditures were grouped into the following broad categories:¹ Defense; Education; Health, Welfare, Housing and Community Services; Transportation and Communication; Public Works; and Administration.

Although GNP per capita provides a convenient indicator of economic growth for certain purposes it fails to provide any description of the structural changes that are embodied in the development process. In order to more closely characterize development such measures as literacy, presence of dictatorship, urbanization, and rate of economic growth must be considered. To better describe the country itself and the geographic, demographic and cultural setting within which the government operates, variables for total area, presence of hostile neighbors, population density, population age distribution, presence of dictatorship, and the character of religious influence are included. Using these measures to characterize a developing nation and the budgeting categories as described, simple linear functional relations were posited.

¹

In all cases these budgets included both capital and current expenditure. Only national government expenditures are included. Local expenditures in most LDCs constitute a small percent percentage of total government expenditure and data are not available.

Various theories of economic development and Thorn's findings that social expenditures rose in the course of development would all suggest that budget items like education, health, welfare, housing, etc. are strongly influenced by changes in per capita income and by the development process itself. Other items are less responsive to changes in societal structure, remaining relatively constant in absolute amount and thus becoming a smaller fraction of the budget. Some items might vary across countries depending on size, geography, and demographic patterns. Expenditure on administration would be expected to exhibit this behavior. (Thorn argues that while a growing economy may require more regulation and administrative services, increases in labor productivity in administration produced by development offset this effect.) Defense expenditure would be expected to be a function of the geographic and demographic factors noted above but may also be expected to be very responsive to political conditions. As political institutions develop, defense expenditure, as a proportion of public spending, may decline (at least over a certain range of national income). Expenditure on infrastructure (transportation, communication and public works) may be a function of both geographic and social variables.

These posited relationships lead to the formation of the following hypotheses:

1. The proportion of government expenditure on social items is a function of variables reflecting the degree of economic and social development.
2. The proportion spent on infrastructure is a function not only of development indicators but also of geographic and demographic variation.

3. The proportion spent on defense is a function of social development as well as national and regional political conditions.
4. Administrative expenses are a function of geographic and demographic characteristics and vary little with level of development.

DATA AND TECHNIQUE

This study considers patterns of government expenditure in 37 countries with per capita incomes of less than \$1,000 in 1976. Ordinary least square (OLS) regressions were deemed appropriate since a simple linear relationship was posited. Results are reported with the t-ratio in parentheses below the coefficient.

The data came from the IMF Government Finance Statistics Yearbook (1979), the World Bank Atlas (1978), and the UN Demographic Yearbook (1977), USAID, Selected Economic Data for LDCs (1977), and US Overseas Loans and Grants (1978), Statistical Abstract of the United States (1979), reports from the Population Council, the State Department, Amnesty International, Freedom House, statistical offices of the various countries, and from estimates made by the authors. Data are for 1976 where possible but in some cases data from the nearest available year was used.

While some variables were taken directly from the data, others were constructed by combining information from various sources or aggregating data presented in more detail than was judged required. Though the number of categories reported in the budgets in the Government Finance Statistics Yearbook varied, we began with 13 categories but later combined these to reflect more general, and thus hopefully more easily explained, categories of expenditure. Defense and

educational expenditure were taken directly from the Yearbook. Health, Welfare (including Social Security), Housing and Community Amenities, Community Development and other religious, recreational and cultural services were all combined into a variable referred to as Health Welfare and Housing (HWH). The variable Administration included General Services Administration, Regulation and Research, Other Economic Services, and Other Purposes.¹ Transportation and Communication includes roads, inland and coastal waterways and other transportation and communication. Public Works reflects expenditure on agriculture, forestry, fishing, mining, manufacturing, construction, energy, and water.

While the variables GNP per capita, area, population density (persons per square kilometer), average annual real growth rate per capita (1960-77), percent and number of people 4 to 14 years of age, literacy rate, and percent of the population Catholic or Moslem are self explanatory, other variables require some comment. The dummy variable for hostility was constructed on the basis of reports of bilateral international tensions, border clashes, or acts of aggression in 1976. Dummy variables were established as follows:

- H₁ no hostility
- H₂ presence of any degree of hostility

Similarly, an index of dictatorship was constructed taking into consideration freedom of religion, press, and political association, rights to trial, civil rights status of the population and existence and treatment of political prisoners. The two dummy variables used here were:

¹Other purposes includes public debt transactions, intragovernmental transfers, disaster relief, etc.)

D₁ no hostility

D₂ interference with democratic principles

These two sets of variables were not constructed nor should they be interpreted as precise measures of the domestic or international climate of these nations. Rather, they were meant to give some indication of the variety of political circumstances under which development and concomitant government expenditure take place. It was felt that some indication of these forces was necessary if any explanation of the pattern of government expenditure was to be obtained.

The variable foreign military aid consists of US military assistance to the country. Foreign economic aid consists of gross Official Development Assistance from OECD, OPEC and some international agencies. These variables were used with the intent of providing estimates of the size and type of foreign assistance available to LDCs. This, it was felt, would be a consideration for governments in deciding how to allocate domestic funds. These variables should not be taken as exact measures of the foreign aid received by a country in that year from all sources. Again, the figures are only meant to be indicative.

Data for LDCs are inadequate and international comparisons of data suffer from many problems as well. Statistics were taken as reported, but it is not clear that in all cases each category covered the same items. In attempting to bring into consideration many aspects of a nation's structure we have, of course, expanded the number and magnitude of the deficiencies from which the data suffer. It is hoped, however, that these may not be too great and that the added breadth of perspective is worth the risk.

RESULTS

The results are somewhat less than exciting, but they do point out that the pattern of government expenditure depends on something more than just the level of development as measured by per capita GNP. While this study has not found all of those variables that must be considered, it does indicate some directions. The variables are identified at the end of the paper.

Defense Expenditure

Table I presents the regressions that were run and the results obtained. It can be noted that the proportion of the budget spent on defense is much more a function of socio-cultural and political variables than of income. Equation 2 seems to suggest that the presence of dictatorship is significant in determining defense expenditure. This is understandable when one considers that the distinction between national defense and internal security is sometimes blurred in a dictatorial administration. The influence of hostile neighbors is not clear. Though it cannot be concluded from equation 3 that the coefficient of H_2 is significantly different from zero, taken together, D_2 and H_2 contribute significantly to the explanation of the dependent variable. The results also suggest that military aid results in higher government expenditure on defense. That is, it does not appear that military aid frees a country's resources to provide other public services.

It is interesting to note that cultural factors enter as well. Predominantly Moslem nations tend to spend more on defense and to some extent Catholic nations may do the same. One wonders, however, whether the variable "percent Catholic" does

not act much like a dummy variable for Latin America (since the majority of countries with a large Catholic population are in Latin America) and thus is not identifying the right explanatory variable. Grouping these LDCs by geographical region would result in two few observations, but perhaps if it were possible to do so results might show that there is a demonstration effect from the United States.

TABLE I: Defense

1.	Def2DAA = .10 + .0011 %M + .0007 US Mil Aid	
	(2.84) (2.90)	$R^2 = .2699$
		F = 7.6
2.	Def2DAB = .066 + .0012 %M + .0007 US Mil Aid + .05 D ₂	
	(3.19) (2.75) (1.7) ²	$R^2 = .3052$
		F = 6.27
3.	Def2DAC = .081 + .00093 %M + .0007 US Mil Aid + .04 H ₂	
	(2.37) (2.67) (1.32) ²	$R_2 = .2854$
		F = 5.79
4.	Def2DAD = .054 + .0011 %M + .0006 US Mil Aid + .044D ₂ + .003H ₂	
	(2.69) (2.57) (1.4) ² (1.1) ²	$R_2 = .3078$
		F = 5.0

Education

The results of regressions run on the proportion of government expenditure allocated to education are presented in Table II.

As might be expected, there seems to be a strong correlation between per capita income and educational expenditures. In fact, educational expenditure seems to be the item in the budget that is most affected by per capita income. Several other variables that might be expected to be important proved to be insignificant. No relation between the percentage or number of children of school age and educational expenditure could be substantiated. From Equation 4 it seems clear that the coefficient on "Population 4-14" may well be zero. The rate of economic growth is another variable that did not prove significant. If the rate of economic growth (real rate of growth of GNP per capita) can be used as a good proxy for the probable returns on investment in human capital, then it would appear that the decision to allocate funds to education is not made on the basis of cost-benefit analysis involving the maximization of income streams over time. This result should be taken with some caution since growth rate may not be the right variable to use in estimating returns to human capital.

Negatively correlated with educational expenditure is the country's literacy rate, suggesting that a largely illiterate populace provides stimulus to increased levels of spending on education. Moslem nations show a distinct difference (percent Moslem is negatively correlated with expenditure on education), but there was no significant relation between percent Catholic and educational expenditure.

As foreign military aid was for defense, foreign economic aid appears to be a significant factor in the determination of the expenditure on education but in a negative way: to the extent this foreign aid is available, governments

spend less on education. There is a slight indication the same holds true for the Health, Welfare, and Housing variable. If this is the case, one wonders into which categories of expenditure the funds are going. Economic aid did not seem to be significant in the defense regression, for example.

In summary, these results suggest that the expenditure on education is determined on the basis of per capita income and socio-cultural expectations about the responsibility of government to provide educational facilities for its citizenry, the perceived urgency of the need, and the availability of alternative funding (foreign aid) to meet this established level. This approach would not emphasize student-teacher ratios or individualized instruction where class size would be important. Perhaps this kind of education becomes a reasonable expectation only at higher levels of income, and it might be the case that the size of the population between 4 and 14 years would be significant in a sample of wealthier countries.

TABLE II: Education

1.	ED3D' = .0016 + .0065 GNP _c - .037 %M - .037 Lit - .0049 OECD	R ² = .2697
	(1.8) ^c (-1.5) (-1.02) (-2.0)	F = 4.3
2.	EDID = 16.329 + .006 GNP _c - .041 Lit - .0366%M + .168Gro - .0051 OECD	
	(1.5) ^c (-1.04) (-1.4) (.28) (-1.9)	R ² = .2480
		F = 3.37
3.	ED = .16 + .00007 GNP _c - .0004 %M - .00006 OEDC - .0005 Lit + .0003 Pop 4-14	
	(1.9) (-1.4) (-2.1) (-1.2) (.75)	R ² = .2597
		F = 3.5
4.	ED = .20 + .00007 GNP _c - .0004 Lit - .0004 %M - .0005 OECD - .0009 %Pop 15	
	(1.7) (-1.0) (-1.4) (-1.9) (-.29)	R ² = .2482
		F = 3.4

Transportation and Communication

The results presented in Table 3 continue to demonstrate that per capita income is neither the sole nor the primary determinant of the pattern of government expenditures. While per capita income is significant, its coefficient is not large. Land area is significant, and its coefficient is always negative. Several explanations might be posited for this surprising result. Since roads are by far the largest component of Transportation and Communication much depends on the nature of road construction. If there are large economies of scale, this negative coefficient might be plausible. If land values are lower in larger countries owing to the abundance of land, then road building might be cheaper. The negative relation between the degree of urbanization and transportation expenditure and the insignificance of the coefficient on population density suggest that it is the extent of transportation service provided rather than land value that influences the size of allocations to this category of expenditure. That is, with a high proportion of the population living in urban areas, fewer miles of road are required to meet the needs of the area's inhabitants. It could also be argued that road building in countries with vast areas to be serviced is often financed by international agencies, these inflows not always appearing in the budget along with domestic funds.

The significance of literacy is assumed to be related to the communication component of this item. As literacy increases, the size of the media market will expand, and one could expect increasing private participation in this field and thus declining government participation.

Quite puzzling is the positive significance of the variable "Population under 15 years." Transportation to and from school is presumably budgeted under

education. Perhaps there is an employment motive involved. Though one would imagine that children under 15 are not strong enough for heavy construction perhaps employment on such projects frees jobs in the informal sector such as selling, shoe shining, etc. for younger members of the population.

TABLE III. Transportation and Communication

$$\begin{aligned}
 \text{TRAY1} &= .17 + .00015 \text{ GNP}_c - .00005 \text{ Area} - .0008 \text{ Lit} + .0004 \text{ Pop 15} \\
 &\quad (2.4) \quad (-2.6) \quad (-1.9) \quad (3.3) \\
 &\quad -.0007 \%M - .002 \text{ Urban} - .009 \text{ Gro} \\
 &\quad (-3.0) \quad (-2.1) \quad (-1.4) \\
 &\quad R^2 = .3825 \\
 &\quad F = 4.2 \\
 \\
 \text{TRAY2C} &= .17 + .00014 \text{ GNP}_c - .00005 \text{ Area} - .0008 \text{ Lit} + .0004 \text{ Pop 15} \\
 &\quad (2.1) \quad (-2.5) \quad (-1.7) \quad (3.3) \\
 &\quad -.0007 \%M - .002 \text{ Urban} - .008 \text{ Gro} + .00005 \text{ Pop Den} \\
 &\quad (-3.0) \quad (-2.0) \quad (-1.1) \quad (-.37) \\
 &\quad R^2 = .3636 \\
 &\quad F = 3.6
 \end{aligned}$$

Striking is the fact that percent Moslem is again a significant explanatory variable. Moslem countries have lagged badly in building roads and apparently they are now catching up.

Public Works

Most disappointing were the results from regressions on Public Works expenditure. Many different models were tested but none of the geographic, demographic or socio-cultural variables provided satisfactory explanations. The model on the next page yielded the best results:

$$\text{PWD1A} = .17 - .045 H_1 - .009 \text{ Gro} - .00004 \text{ OECD}$$

$$(-1.9)^1 \quad (-1.4) \quad (-1.2)$$

$$R^2 = .07$$

$$F = 1.8$$

The inability of these models to explain public works expenditure may be due in part to the nature of public accounting. The heading Public Works includes expenditure on agricultural assistance, natural resource management, assistance to extractive industries and electricity, steam, gas and water. Yet other kinds of infrastructure projects that might be thought of as public works (flood control, irrigation, construction of electric power facilities, and navigation projects) are included with commercial services and regulatory functions and included in this paper with Administration expenditure. Public Works could be considered as government assistance to the primary sector. While urbanization may give us some indication of the relative size of this sector in terms of population, what may be lacking from these models is some better measure of the size (in terms of contribution to GNP) of the primary sector and/or some indicators of the natural resource endowments of each nation.

Administration

The results from regression on the proportion of government expenditure on administration services is as follows:

$$\text{ADM} = .36 - .00013 \text{ GNP}_c + .00009 \text{ Area} - .066 H_2$$

$$(-1.8) \quad (2.7) \quad (-1.8) \quad R^2 = .2578$$

$$F = 5.16$$

It is clear that countries of greater land area must spend more in order to provide decentralized government representation. While some administrative functions remain in the capital (legislature, budget office, government printing office) others must be dispersed around the country (custom houses, police stations, law courts, research stations and storage facilities).

One would not expect most of these activities to be very responsive to changes in income. A certain minimal level of services would be required in many cases, and if we assume that total government expenditure rises with per capita income, then the proportion spent on administrative services would fall. External affairs, which are also included in this category, might be expected to rise with income, or at least they are not great enough to overwhelm the other items.

The influence of hostile neighbors on administrative spending is surprising. This may represent changes in the public order and safety component of administrative expense. In the face of hostility many responsibilities of domestic security may be transferred to the armed forces. This would result in a reduction of expenditures for public order and safety under the administrative heading. This category of expenditure proved to be relatively unaffected by most other socio-economic variables.

Health, Welfare, and Housing

The results in Table IV of regressions on HWH continue to indicate that GNP per capita is not always a highly significant explanatory variable in explaining patterns of government expenditure. In this case, land area seems to be the most significant variable.

Large area countries, contrary to what might be expected, spend less on HWH services. Though clearly significant, the coefficient on area is minimal. For some countries, the inverse relationship reflects lower land prices for housing and hospital construction. On the other hand, perhaps the inverse relation with area suggests that there is total neglect of remote regions in the provision of social services. Taken with the positive correlation between urbanization and HWH (which likely reflects the ability of urban communities to organize and more forcefully demand social services) one might conclude that HWH expenditures in rural areas would not be great in any case but that distance from the capital (presumably the decision-making center) makes remote areas easier to ignore and thus channels funds out of HWH.

TABLE IV: Health, Welfare and Housing

1.	HWHY6 = .13 - .00006 Area - .0003 Pop Den + .0006 Lit + .0015 Urban				
	(-2.5)	(-1.5)	(1.0)	(1.6)	
					$R^2 = .2567$
					$F = 4.1$
2.	HWHD = .14 - .00008 GNP _c - .0003 Pop Den + .0007 Lit + .003 Urban				
	(-.92)	(-1.68)	(1.14)	(1.8)	
	-.00007 Area				
	(-2.65)				$R^2 = .2532$
					$F = 3.44$

CONCLUSION

Taken together, the results of these regressions tend to confirm the view that the pattern of public expenditure is a function of a number of variables of which GNP per capita is but one. Variables reflecting social, demographic and political structure contribute to the explanation of variation in the dependent variables and geographical setting proved to be important as well. If these variables do in fact capture some of the structural changes that accompany growth, then it appears that the pattern of public expenditure will change as development takes place. The results of the tests on our four hypotheses indicate that while we have not been able to fully explain the observed variation on expenditure patterns, it is partially explained by the variables we specified. The size of social expenditure relative to total expenditure does change with the level of development. Increases in per capita income, urban residence, and decreases in foreign economic aid received may be considered signs of a higher level of development and result in increasing expenditure on Education and Health, Welfare and Housing. Increases in literacy, another sign of development, result in a smaller proportion of total expenditure devoted to education but more to Health, Welfare and Housing.

The conclusion with regard to the second hypothesis, that infrastructure varies with development and national characteristics, is less clear. It appears that technology employed and type of services provided may be more important considerations than the level of economic development.

Administration expenditure does seem to vary somewhat with per capita income and according to geographic conditions, but it proved not to be correlated with other indicators of development.

Our hypothesis on defense spending was confirmed. Defense spending appears to be strongly related to political and cultural conditions rather than to indicators of economic conditions.

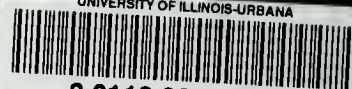
The significance of variables such as dictatorship, hostility, and percent Moslem demonstrates the importance of the political and social setting in determining the allocation of funds among the various categories. Interestingly enough, there is no indication that a dictatorship is better able to marshall resources for development; dictatorship proved to be significant only in the model of defense spending. Social expenditures were not significantly correlated with dictatorship. The existence of hostile neighbors will affect the allocation of funds, reflecting, perhaps, the changing roles of government agencies in time of crisis.

The process of allocating public funds to various types of expenditures is a complicated one and one subject to many influences. These influences may be a reflection of the larger society and its social and political character. To adequately explain the pattern of public expenditure, these forces must be considered. To the extent that development changes the social and political character of a nation, the pattern of public expenditure may be expected to change with the level of development.

1.	Def	Defense expenditure as a percent of total expenditure
2.	Educ	Education expenditure as a percent of total expenditure
3.	T & C	Transportation and Communication expenditure as a percent of total expenditure
4.	PW	Public Works expenditure as a percent of total expenditure
5.	ADM	Administration and General Services expenditure as a percent of total expenditure
6.	HWH	Health, Welfare, Housing and Community Services expenditure as a percent of total expenditure
7.	GNP _c	Gross National Product per capita measured in 1977 US dollars
8.	Area	Area of land surface expressed in square kilometers
9.	Pop Den	Average number of persons per square kilometer
10.	Pop < 15	Number of inhabitants under 15 years of age
11.	Lit	Percent of population judged literate by UN standards
12.	% M	Percent of population of Moslem religion
13.	D ₁	Dummy variable: absence of dictatorship
14.	H ₁	Dummy variable: absence of hostile neighboring countries
15.	D ₂	Dummy variable: interference with democratic principles
16.	H ₂	Dummy variable: presence of any hostile neighbors
17.	Gro	Rate of economic growth expressed in terms of average annual rate of growth of real GNP per capita between 1960-1977
18.	%C	Percent of population of Catholic religion
19.	US Mil Aid	Dollar value of all forms of military aid received in 1976 (included grants and credits)
20.	OECD	Dollar value of total Official Development Assistance
21.	Pop 4 - 14	Number of persons between the ages of 4 and 14
22.	Urban	Percent of population living in urban areas
23.	% Pop < 15	Percent of population under the age of 15



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